John Day River Smallmouth Study

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History of the Fishery

The John Day River Basin has been well known for its diversity of fish resources, particularly its spring chinook salmon and steelhead trout. The spring chinook population is the largest remaining totally wild run and the steelhead population is one of the largest in the entire Columbia River Basin. In recent years, the John Day River has been gaining notoriety for its smallmouth bass fishery. There have been articles published *in Outdoor Life, Sports Afield, Warmwater Flyfishing, Flyfishing,* and *InFisherman* describing the quantity and quality of the fishery. Outfitters on the Internet are advertising "100 fish per day averaging 3-5 pounds." The John Day District office has received calls from Kansas, Illinois, Florida, Missouri, Colorado, Idaho, and California within the last year requesting information for the type of gear, the best time of year and the best areas to go catch smallmouth.

Smallmouth were first introduced into the John Day River in 1971, after intensive surveys showed that major portions of the lower river served only as migration corridors for anadromous salmonids. The lower river is inhospitable to salmonid rearing because of warm water temperatures and extreme flow fluctuations. This part of the river had virtually no spring or summer sport fishery and high densities of northern pike minnow (squawfish). Smallmouth existed in the Columbia River since the 1930's but were apparently unable to negotiate Tumwater Falls at RM 10 (Figure 1). The decision to introduce smallmouth to the river took several years, because of concern for predation on the migrating salmon and steelhead. Eventually, the Oregon Wildlife Commission determined that the risk to salmon and steelhead would be minimal, and that the smallmouth could provide a significant fishery. In May of 1971, 62 adult bass from Willow Creek Reservoir (Morrow County) were planted in the John Day River near Service Creek and another 18 adult bass from Warm Springs Reservoir were planted that October near Kimberly. The fish planted in May spawned successfully the first year and the population rapidly expanded into all suitable habitat. Bass currently occupy the mainstem up to Dayville (RM 212) and the North Fork up to Wall Creek. Seasonal distribution may extend several miles up the North Fork to Highway 395 (RM 60) and up the mainstem as far as Mt. Vernon (RM 239). Salmonids occupy virtually all tributaries and much of the mainstem in the upper portion of the watershed.

Smallmouth habitat in the John Day River is fairly typical of most rivers occupied by bass, dominated by boulders, rock ledges, deep pools, shoal areas and gravel bars.

Management

The river is split into two management strategies, a Basic Yield area that has good access by roads and a Quality Fishery area that has limited public access. The Basic Yield area above Service Creek (RM 157) is readily accessed by State Highway 19 and the Kimberly/Monument Highway. The Quality Fishery area (between Service Creek and Tumwater Falls) is accessible only by boat or at a handful of scattered points. Minimum trip length for the most commonly floated sections is a full day from Service Creek to Twickenham, three days from Twickenham to Clarno, four days from Clarno to Cottonwood Bridge and two days from Cottonwood Bridge to McDonald Ferry. The Basic Yield area is where the greatest potential for overlap between anadromous salmonids and smallmouth is likely to occur.

The goal of the Basic Yield area is to provide a variety of sizes of fish to anglers. Quality Fishery areas are managed to increase the abundance of mid- to large-sized fish. The goal for the Quality Fishery area in the John Day River is to have at least 20% of the fish caught by anglers to be over 12".

Statewide angling regulations apply to both management areas. Current bag limit is five fish per day with no more than three over 15 inches. In previous years the statewide bag and length limits have been sufficient to provide for a quality fishery, but with increased use we have become more concerned about angler exploitation and the decrease in average fish size.

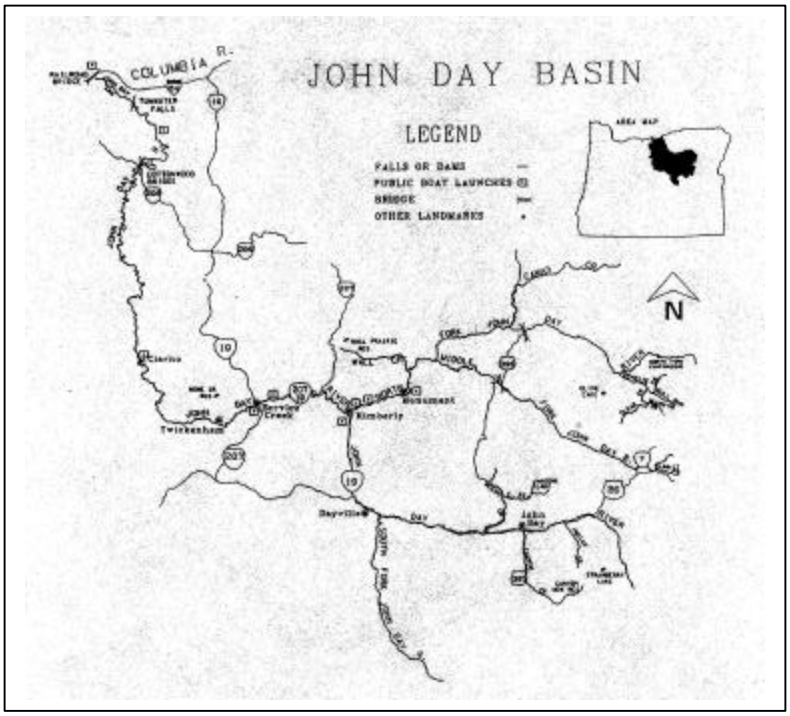


Figure 1. Map of John Day Basin, with major landmarks.

Annual Length-Frequency Sampling

Length-frequency sampling trips have been conducted on a consistent basis since 1985, with a primary objective of evaluating accomplishment of the "Quality" fishery goal. Bass are sampled with hook and line and measured for total length. Some years, scales and weights have been collected to assist with modeling the population. Length-frequency composition in the Quality Area varied during the 1991-1996 time period. The percentage of fish over 12 inches ranged from 7% to 36% with a decrease in percentage in recent years (Figure 2). This is particularly evident since 1993.

Growth and Population Age Structure

Scales were taken from bass during 1991 and 1994 sampling with a goal of ten samples per 10-millimeter length interval. Scales were impressed in acetate and aged by standard methods. Growth of bass in the John Day River is comparable to the Snake River above Brownlee Reservoir and the John Day Pool of the Columbia River, which is not particularly rapid. It takes approximately 5 years for a bass to reach 12", which meets our "quality" requirement (Figure 3).

Creel Survey and Exploitation Study

Concern for an apparent decline in the size of smallmouth bass and increase in angling pressure on the lower John Day River led us to design an exploitation study to investigate those concerns. We did this by conducting a statistical creel survey and a reward tag program conducted in 1992 and 1993. The creel survey was conducted from late-May to the end of October in 1992, and from early June to mid-November in 1993. Creel survey information was used to generate estimates of total angler effort and harvest. A total of 998 reward tags was implanted into bass greater than 10" total length over the duration of the tagging study.

Creel data showed that total effort was 38,886 hours by 9,622 anglers and 38,945 hours by 11,456 anglers in 1992 and 1993 respectively. Estimated catch of smallmouth bass was 1,520 in 1992 and 3,691 in 1993. Adjusted exploitation rates for bass over 10 inches in the Quality Area was 10% or

less in both 1992 and 1993. Greater than 60 percent of bass over 10" were released by anglers (Table 1).

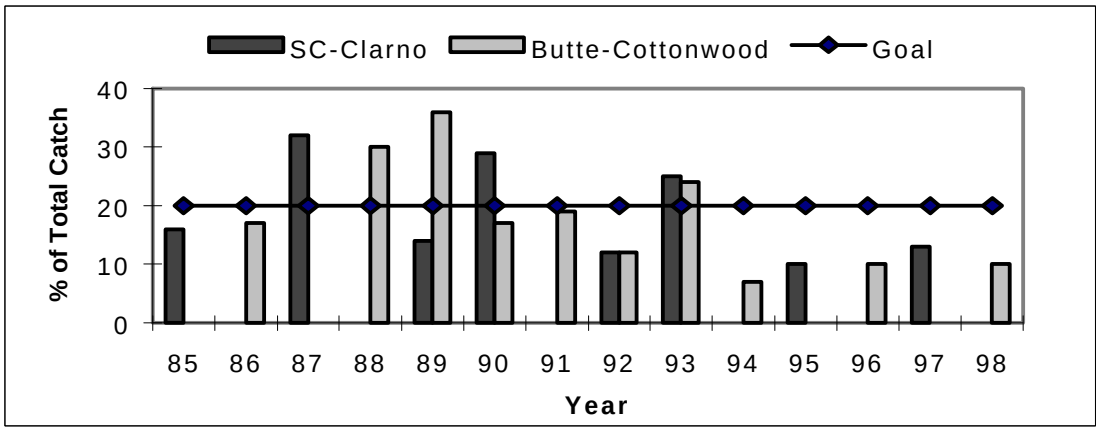
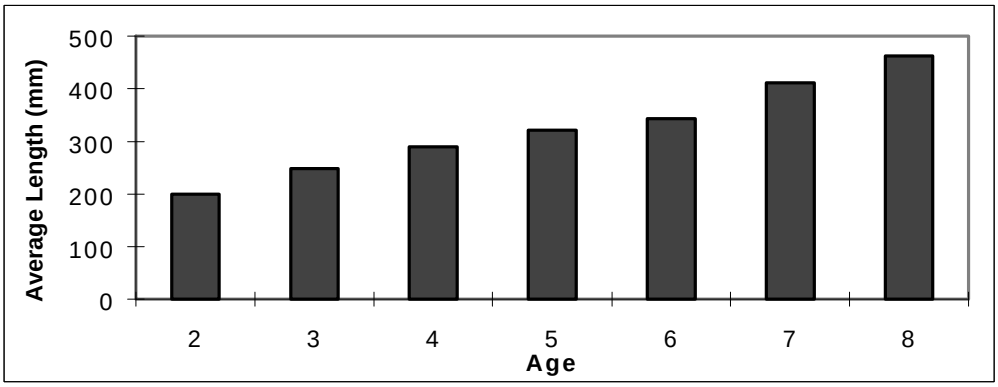


Figure 2. Percentage of smallmouth bass greater than 12" for annual length-frequency trips, 1985-1998.



The goal for the Quality Area is 20% >12".

Figure 3. Estimated average lengths of smallmouth bass for a given age, 1994.

District personnel conducted young-of-the-year sampling between 1978 and 1996 in an attempt to quantify annual spawning success. Each September, two sites were electroshocked using a drift boat mounted shocker and a catch per 1,000 seconds determined (Figure 4).

We determined there was no correlation between our young-of-the-year sampling and recruitment into the population the following year. We have since discontinued our fall sampling.

Although there is no baseline data to verify the increase in recreational use on the river, the number of commercial guided trips is probably representative of the overall trend in use. The number of guided customer days has shown a significant increase in the last 20 years according to Bureau of Land Management data (Figure 5).

Most of the mortality incurred by smallmouth bass in the John Day River is due to natural factors rather than angling, with total instantaneous mortality of 58.5%. Even though most of the bass die from natural causes, modeling indicates more restrictive regulations may provide a modest increase in the number of larger bass. Implementing a 12 inch minimum length limit would increase the percentage of fish caught over 12" to almost 20%, but with an 80% reduction in number of bass harvested. A slot limit that would protect bass from 12" - 16" would increase the number of bass over 12" by 8%, but only decrease harvest by 15%.

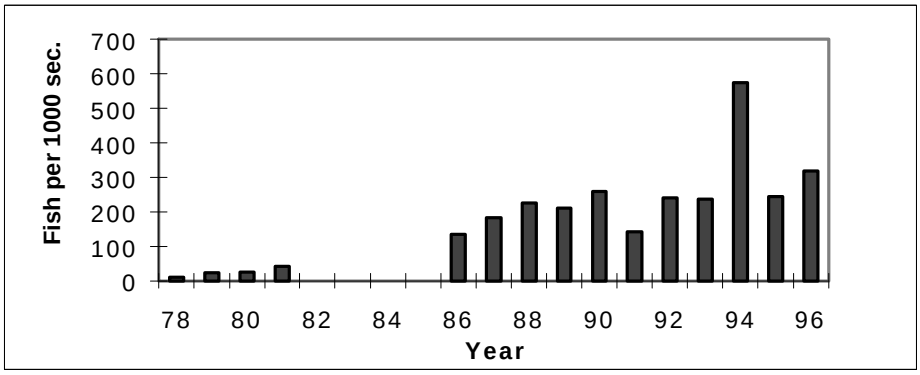


Figure 4. Catch rates during annual young-of-the-year electroshocking at the Service Creek site. Gear types changed between 1981 and 1986, so comparison of catch rates may not be valid.

Table 1. Reported smallmouth bass reward tags recovered in the John Day River. River mile 98 is near the mouth of Butte Creek, at Fossil.

Year Tagged	# Tagged	# Kept [/a]	# Released	RM > 98	RM < 98	Total # Recaps
1992	500	63	90	53	100	153
1993	498	37	62	50	49	101
TOTAL	998	100	152	103	149	254[/b]

[7a] For the purposes of this tally, a "kept" fish was either kept and killed, or released without the tag. Eighteen fish were released minus the tag.

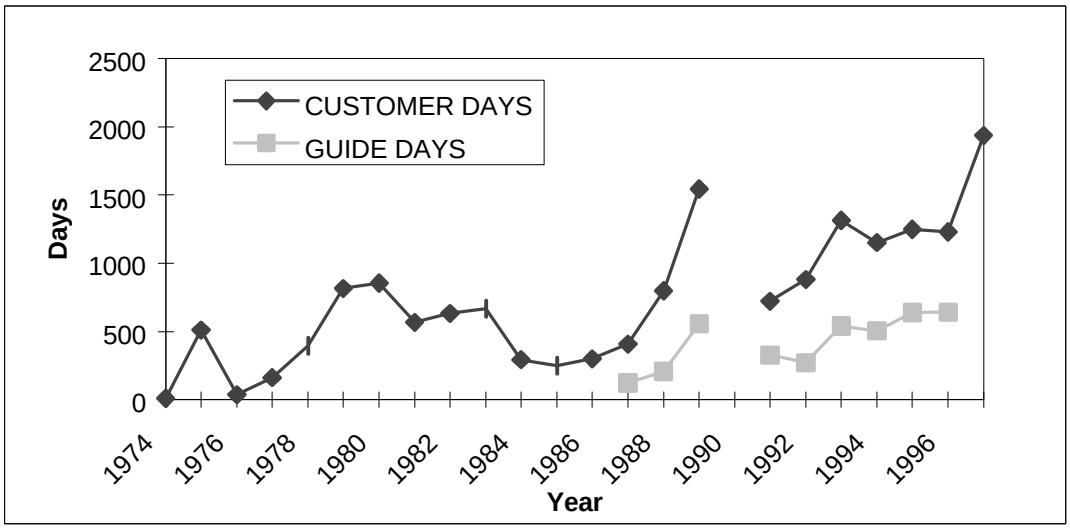


Figure 5. Number of customer days and guide days based on BLM commercial use reports, 1974-1997.

Food Habits

There has been much discussion about the impacts of smallmouth bass on native salmonids in the John Day River. In response to this concern, stomach contents of John Day River smallmouth bass captured during the period from April through August, 1977 and 1978 were analyzed to determine predation levels on juvenile salmonids. Stomach contents were also collected from smallmouth bass in April, 1996 to specifically examine predation on salmonid smolts. The second week of April is the peak outmigration time for spring chinook smolts. Stomach contents were collected either by sacrificing the fish and removing the entire stomach or by pumping contents with a fabricated stomach pump. Stomachs or their contents were immediately placed in 10% ethanol. Food items were later identified and categorized into major groups, and their frequency of occurrence determined. In 1977, the relationship between water temperature from which the fish were taken and the proportion of stomachs containing food was examined.

Crayfish, fish, and insects were the most common food items for smallmouth bass during the 1977-78 study (Figures 6 and 7).

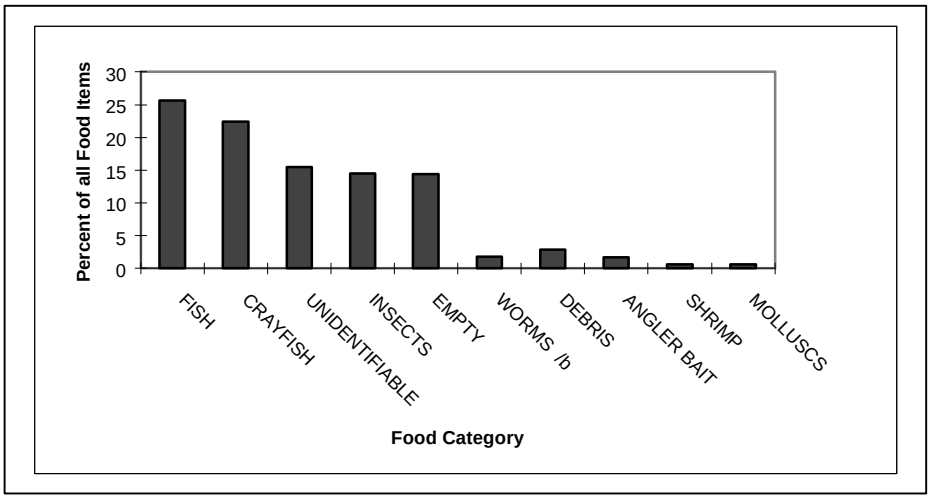


Figure 6. Percent occurrence of individual food items in smallmouth bass stomachs collected April through August, 1977. Fish=fish; Cray=crayfish; Unid=unidentified material; Insc=insects; Empt=empty; worm=non-bait annelids, cestodes, and nematodes; Debr=debris; Bait=angler's bait; shrp=freshwater shrimp; Moll=mollusk.

In April 1996 insects were by far the most important diet item (Figure 8). Inadvertent disposal of some of the 1996 samples reduced the number of stomach content samples examined for the occurrence of insects, plants, crayfish, and worms to 54 but all 60 samples were examined for the presence of fish and/or fish parts. An important difference should be noted regarding the size of bass sampled during April 1996. A higher percentage of bass collected during this time period exceeded the 12" quality fish goal (Figure 9).

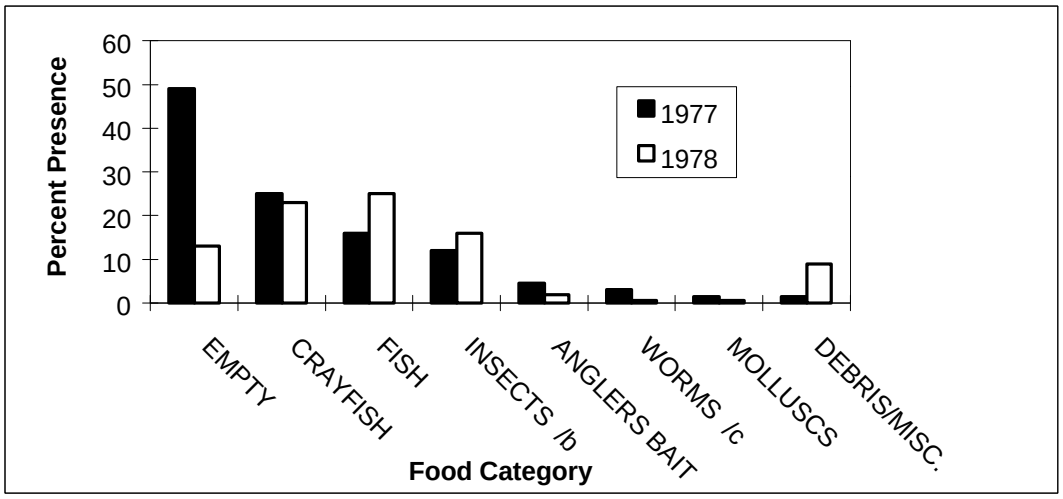


Figure 7. Observed frequency of occurrence of individual food items in smallmouth bass stomachs collected April through August, 1977 and 1978. (Fish=fish; Cray=crayfish; Unid=unidentified material; Insc=insects;; worm=non-bait annelids, cestodes, and nematodes; Debr=debris; Bait=angler's bait; shrp=freshwater shrimp; Moll=mollusk).

Figure 8. Incidence of different food items in smallmouth bass stomachs collected during April 1996.

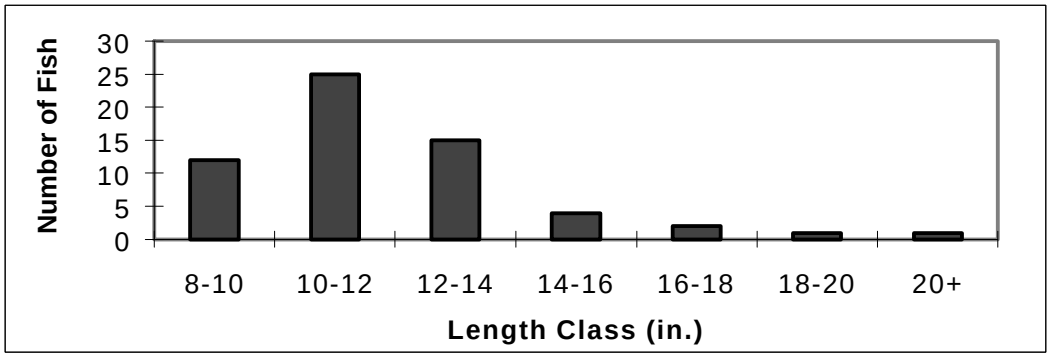


Figure 9. Length frequency of smallmouth bass collected for stomach content analysis, April 1996.

This is consistent with observations of guides, who indicate the best time to catch the larger fish is during April and early-May. A significant difference was noted in the proportion of fish with empty stomachs collected in 1977 at temperatures under 57° F and those over 61° F. The largest percentage of smallmouth bass examined that had empty stomachs occurred in April when water temperatures were below 57° F. No salmonids were identified in any of the samples collected during the 1977-78 study (Table 2).

Water temperatures during April 1996 sampling ranged from 48° F to 55° F and flow ranged from 4,300 to 4,500 cfs. Of the 60 stomachs examined 24 (40%) were empty and only 7 stomachs (12%) contained fish. Two of those fish were identified as suckers, two were non-salmonids (probably suckers), one was a lamprey, one a cyprinid, and one was unknown (possibly a salmonid).

Table 2. Percent occurrence is the number of an individual food item, divided by the total number of food items that month.

	Percent Occurrence By Month (1977)				
Food Item	April	May	June	July	August
Crayfish	44	21	12.5	12	36
Salmonids	0	0	0	0	0
Non-Game Fish	0	24	6	8	5
Unidentified Fish	0	8	19	14	19
Insects	0	6	12.5	26	15
Angler's Bait	0	0	0	2	5
Annelid	0	0	0	0	2
Mollusk	0	0	0	2	0
Debris	0	0	0	8	2
Empty	44	18	0	14	10
Lamprey	0	2	0	0	2
Fresh-Water Crustacean	0	0	0	0	2
Nematode	0	0	0	2	0
Flat Worm	0	0	0	0	2
Unidentified	12	21	50	12	0

In summary, the John Day River is providing a very popular and nationally renowned smallmouth bass fishery in a very scenic setting. Prior to the smallmouth bass introductions, a sport fishery in the river below Dayville did not exist during spring, summer, or early fall. Smallmouth bass in the John Day River exhibit growth patterns very similar to other riverine populations. The introduction of smallmouth bass into the John Day River does not appear to have a significant (if any) impact on native salmonids, based on analysis of over 500 smallmouth bass stomach contents and an analysis of salmon and steelhead spawning data. Chinook salmon spawning surveys show an increase in spawning densities over the last 20 years and summer steelhead spawning surveys follow trends similar to adjacent basins that have either no or very few smallmouth bass. Anecdotal observations of long-time river users indicate that the number of northern pikeminnows has declined since the introduction of smallmouth bass into the John Day River. Even though angler harvest accounts for a relatively small percentage of total mortality, more restrictive regulations could increase the number of bass over 12” with a modest decrease in number of fish harvested.